

Deep decarbonisation and growth: challenges and prospects

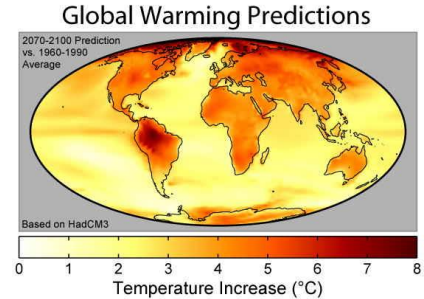


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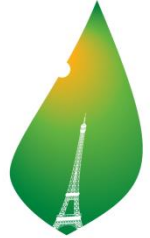
Why deep decarbonisation?

- Without radical reduction of carbon emissions (80% and more), the planet will warm up extremely high (*IPCC*)
- Huge losses of biodiversity, life-supporting ecosystems, human health and lives, etc.
- It would cost us up to 20% of global GDP per year (*Stern Review*)

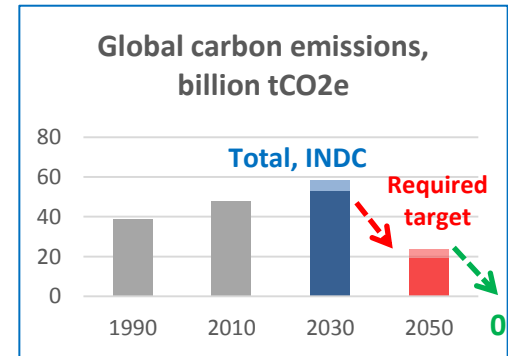


Are we serious about it?

- Paris Agreement – good
- (i)NDCs – not yet
- Ready to deeply reduce emission? – no
- Hoping for “gas pause”? – yes
- Renewables? – “maybe later”
- However, “Business-As-Usual” has already been changing

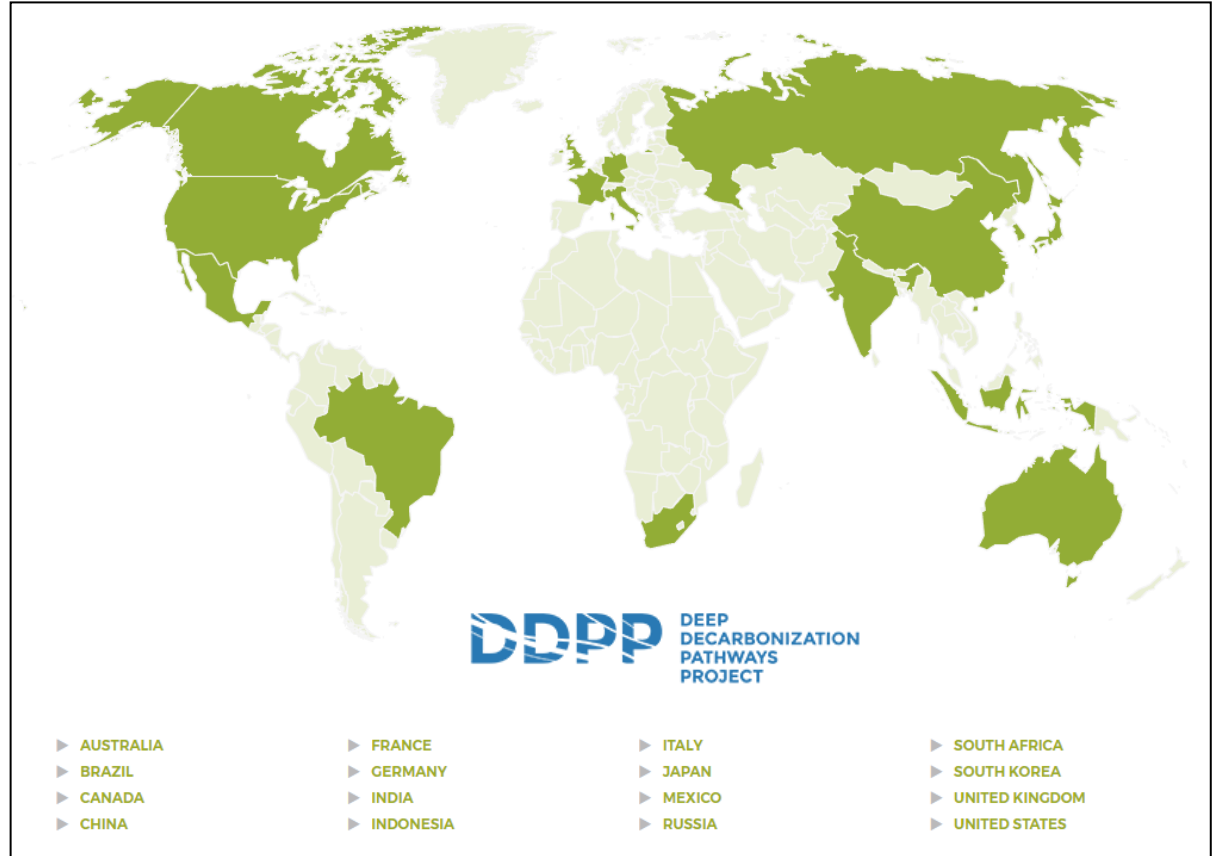


PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11



Deep decarbonisation pathways in 16+ countries

- World leading economies
- About 80% of CO2 emissions
- Foundation for “2050 Decarbonisation Platform”

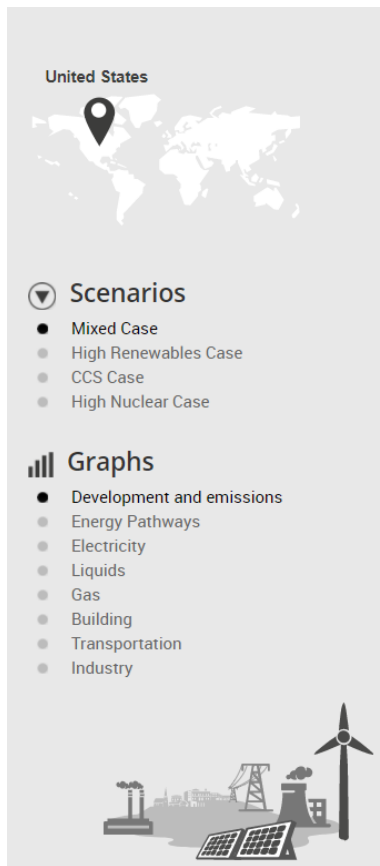


Deep decarbonisation: the US case

- The US is able to reduce emissions by 85% and grow up by 2050

- With gradual transformation of its economy and energy system

- And the cost is modest, surprisingly!



Development indicators from 2010 to 2050

Population



GDP



GDP/CAP



Pilars of decarbonization from 2010 to 2050

Energy intensity of GDP



Electricity emissions intensity

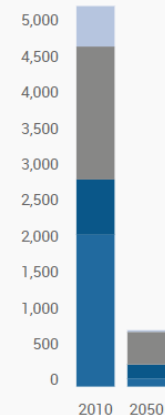


Electrification



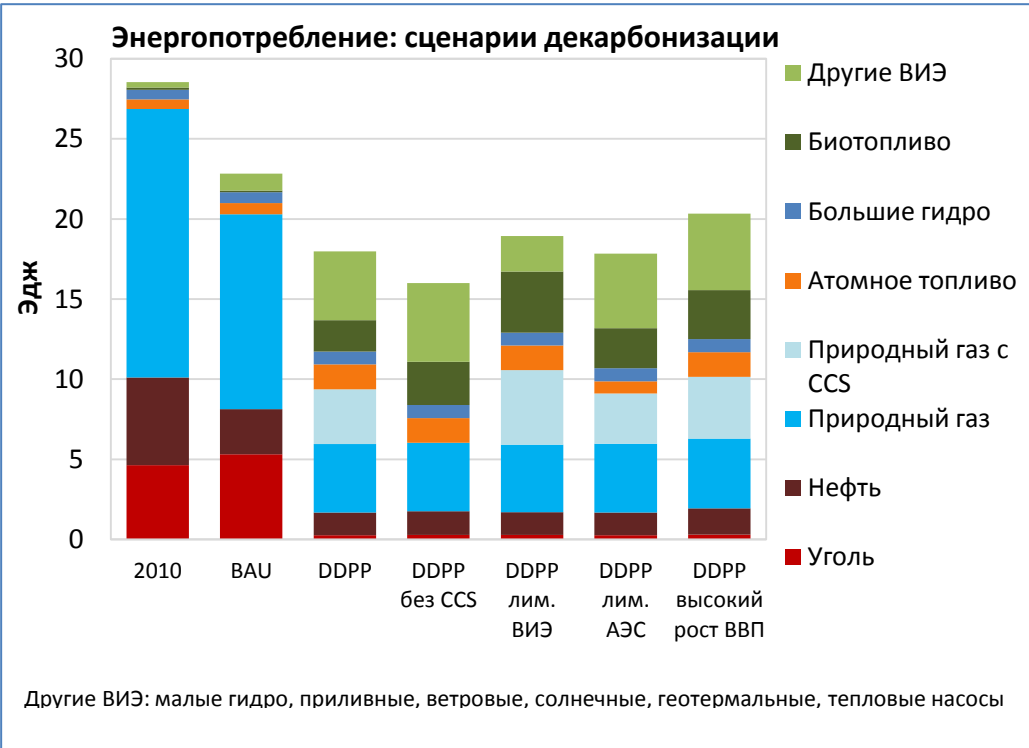
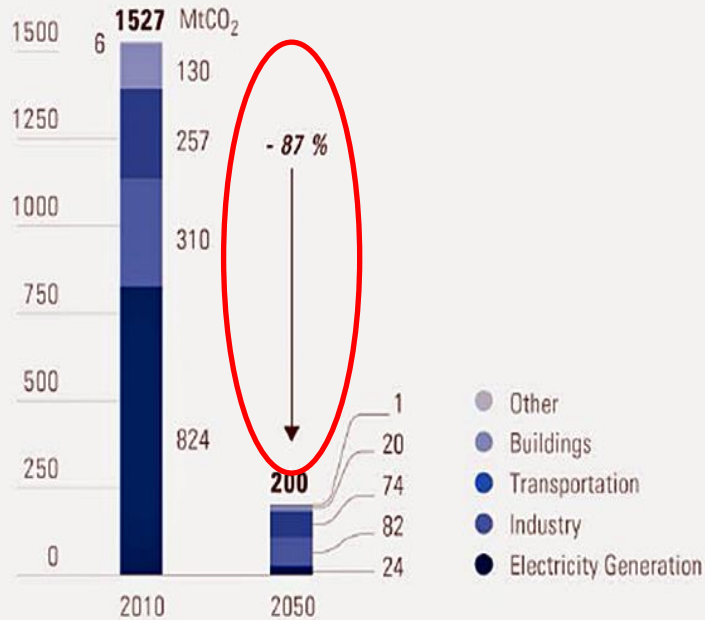
CO2 emissions

MtCO2



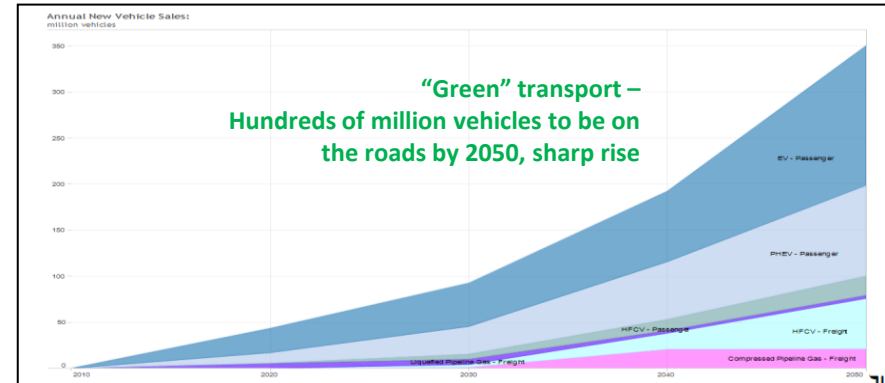
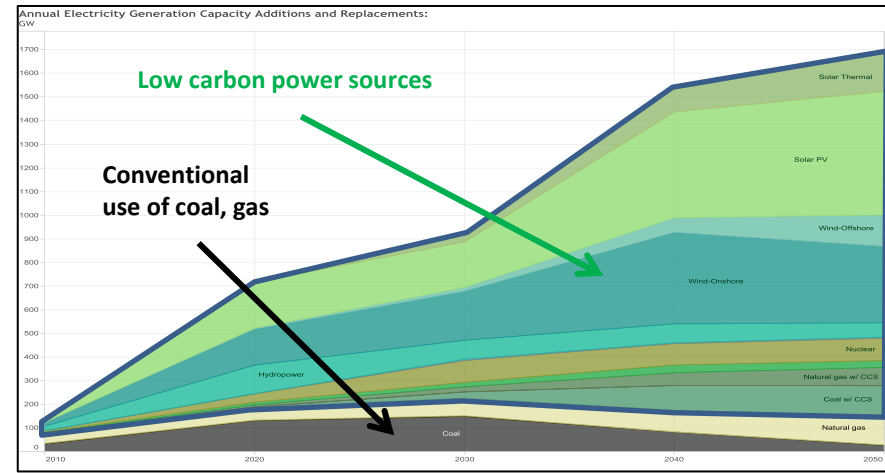
Russia's decarbonisation options are also available

Figure 5. Energy-related CO₂ Emissions Pathway, by Sector, 2010 to 2050



Decarbonized world: absolutely different energy markets and technologies

- The share of conventional fossil fuel use in new installed capacities will become negligible
- Domination of green energy sources, especially after 2030
- “Green” transport boom:
 - Electric vehicles
 - Fuel cells
 - Biofuel
 - Massive change of transport infrastructure in favor of zero-carbon transport
- We already witness the beginning of such changes in many countries, and here at **EXPO-2017!**



Costs?

The cost reductions are expected in all low carbon technologies for energy and transport

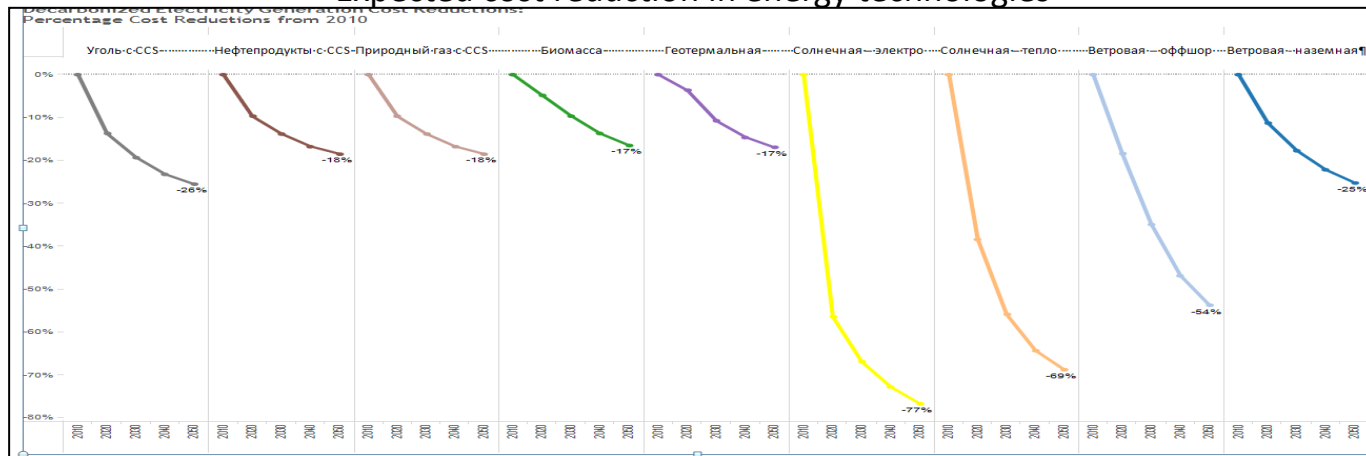
E.g. solar PV may go down by 77% below 2010 price by 2050

Hydrogen vehicles can get cheaper by 79% by 2050

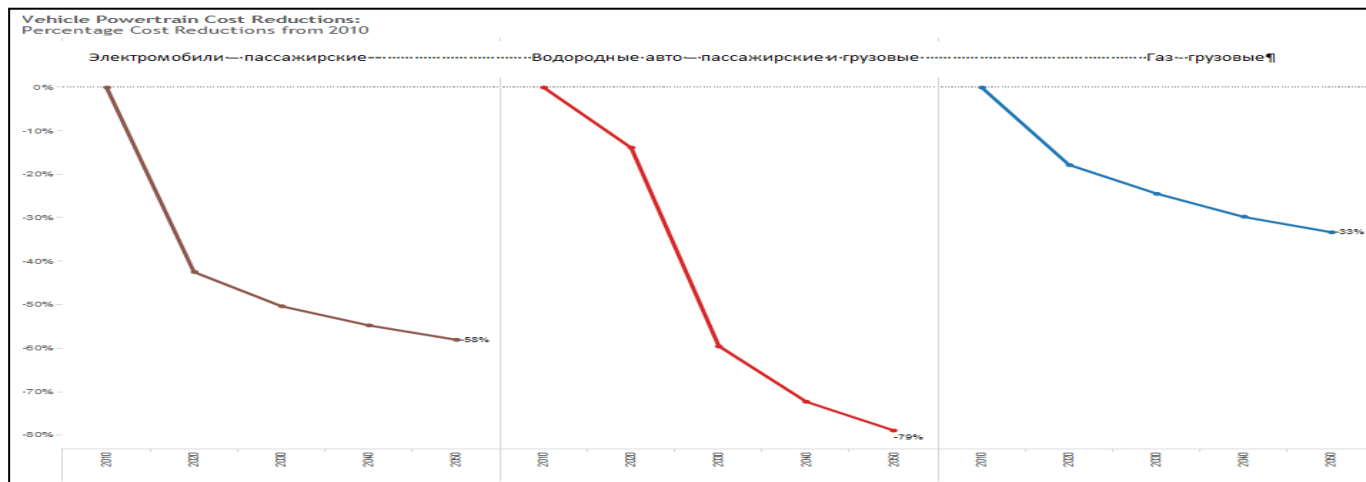
Electric vehicles price: sharp drop by 40% already by 2020

Overall cost of decarbonization of the world economy is estimated at 0.8-1.2% of GDP per year

Expected cost reduction in energy technologies



Expected cost reduction in transport



Divestments from “carbon assets”

- In 2016 the total value of investments committed for decarbonisation reached **\$5 trillion**
- About 2500 investors refuse to invest in fossil fuels now
- Ban on new coal projects by international financial organizations
- Rearrangement of the portfolios of large scale investors:
 - Norway Pension Fund,
 - California Public Employees’ Retirement System,
 - Sweden’s AP2 Pension,
 - pension funds in the US, Australia, Denmark,
 - health care institutions,
 - faith-based organizations
- Private investors also prefer “green”!



Green innovations

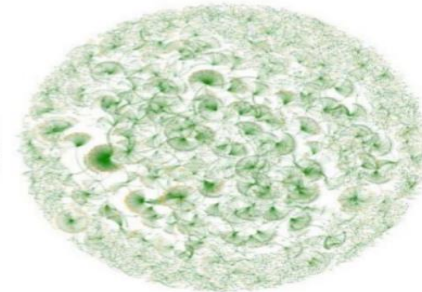
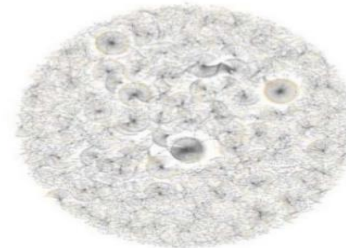
- Amount of start-ups in zero-carbon energy, transport, new materials is growing hyperbolically
(Telsa, Nissan, Bill Gates...)



Spillovers much higher in clean

Citations to 1000 dirty...

...and 1000 clean innovations



- Amount of patents in clean innovations is exceeding the “dirty” ones



Recent news

- ICAO decision on carbon emissions from international aviation (Oct 2016)
 - Requirement to report and compensate all emissions
 - Use of verified emission credits (primarily from forest projects)
- UN decision to phase down emissions of HFCs – a very powerful greenhouse gas (Oct 2016)
 - Will gradually reduce consumption of HFCs in refrigeration systems
- Germany, France, Sweden ... :
 - A ban on purchase and use of fossil fuel-based automobiles in the next 15-20 years



Not easy

- Such transformation is not easy, often hard to implement
- However a lot is at stake. Not just climate. Or people's lives and health.
- The economic drivers are getting stronger.
- And the will to innovate and be a leader matters more and more.



EXPO 2017
• Future Energy •
Astana Kazakhstan

Thank you for attention!

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